



International Journal of Multidisciplinary Research and Growth Evaluation.

Research on teaching methods of animal biochemistry under the background of new agricultural science: Take glucose metabolism as an example

Wei Hu ¹, Xiangfeng Huang ^{2*}, Hanwen Yuan ³

¹⁻³ Yangtze University, Jingzhou, Hubei, China

* Corresponding Author: **Xiangfeng Huang**

Article Info

ISSN (online): 2582-7138

Volume: 03

Issue: 03

May-June 2022

Received: 21-05-2022

Accepted: 07-06-2022

Page No: 605-608

Abstract

Animal biochemistry is a core course in the training plan for animal professionals. Glucose metabolism is an important material metabolism basis in the curriculum system of animal biochemistry. Under the background of new agricultural science, the present article takes glucose metabolism as an example to explore how to improve the teaching effect of animal biochemistry teaching practice. For this purpose, the author adopts teaching methods such as case introduction, questioning and flipped classroom to explore teaching methods in order to cultivate students' autonomous learning ability, innovative thinking ability and problem-solving ability.

Keywords: Research, animal biochemistry, metabolism

1. Introduction

The construction of new agricultural sciences is an important measure to adapt to the agricultural development and agricultural technology personnel training in the new era of socialism with Chinese characteristics. It is a talent strategy for higher education to lay out new business forms, new industries and new models, and provide strong support for national food security, ecological security and rural revitalization ^[1]. In 2019, the Ministry of education of the people's Republic of China issued the "Anji consensus - Declaration on the construction of New Agricultural Sciences in China", marking that China has entered a new era in the construction of new agricultural sciences. Subsequently, it successively put forward the "beidachang action" for the construction of new Agricultural Sciences and launched the "Beijing Guide", which constitute the framework system for the construction of new agricultural sciences ^[2, 3]. Under this circumstance, we must deepen the teaching reform and put the focus of the teaching reform on the curriculum construction to strengthen the construction of New Agricultural Sciences and cultivate new agricultural and forestry talents who know, love and serve agriculture. Yangtze University is an agricultural university affiliated to Hubei Province. Under the overall framework of the construction of New Agricultural Sciences, we must combine the development needs of Jianghan characteristic agricultural industry to achieve the strategic goal of our agricultural specialty to serve the revitalization of local villages. "Animal biochemistry" is a subject that studies the chemical composition, structure, function and metabolic change law of organisms at the molecular level and it is highly theoretical and practical, and it is a compulsory professional basic course for bioscience majors ^[4]. In order to provide reference for the construction and teaching development of animal biochemistry course and improve the teaching quality under the background of new agricultural science, this paper takes the sugar metabolism in animal biochemistry course of aquaculture specialty of Yangtze University as an example to show the teaching methods and skills used in the teaching process.

2. Teaching objectives

Teaching objectives include three aspects: knowledge objectives, ability objectives and emotional objectives (as shown in Table 1).

Table 1: Teaching objectives of glucose metabolism

Item	Teaching objectives
Knowledge Objectives	Understand the classification of sugar and master the physiological function of sugar
	Accurate description of anaerobic sugar decomposition process and rate limiting enzymes
	Master aerobic decomposition process and tricarboxylic acid cycle process
	Able to calculate the energy generated during the tricarboxylic acid cycle
	Accurate description of pentose phosphate pathway
Ability Objectives	Be able to use biochemical knowledge of glucose metabolism to develop healthy eating habits
	Be able to use biochemical knowledge of glucose metabolism to carry out health publicity for diabetes patients
	Cultivate students' rigorous "biochemical thinking" and "biochemical logic"
	Cultivate students' ability to learn actively, find and solve problems
Emotional Objectives	Cultivate students' correct outlook on life and values, and cultivate students' patriotism and sense of social responsibility

2.1. Select life examples to introduce topics

Case based study (CBS) is an open teaching mode that introduces real life and industry practice into theoretical classroom teaching and enables students to bring professional problems into the theoretical teaching process through familiar cases in daily life. Animal biochemistry is a science that explores the nature of animal life phenomena at the molecular level. From the content point of view, it involves abstract basic concepts and various metabolic processes, which makes it a little difficult for students to learn. However, considering that animal biochemistry is a subject closely related to the reality of life, there are rich, extensive and ubiquitous life case resources in life. Therefore, in animal biochemistry, we try to reveal the profound biochemical principles contained in life examples through vivid, concrete and in-depth analysis of typical life examples. Explain the chapter of glucose metabolism, production of beer by fermentation; production of yoghurt by fermentation; body ache after strenuous exercise; excessive intake of sugar will cause obesity, diabetes and other life-related cases and so on can be exemplified, attracting students to participate in classroom interaction, stimulate their desire to explore, and introduce the content of sugar metabolism related courses.

2.2. Focus on the process of glucose metabolism and use a variety of teaching methods to clarify its key and difficult points

2.2.1. Carry out discussion teaching, and liberate the teaching time and space constraints with the help of high-quality online teaching resources

Discussion teaching is based on the friendly interaction between teachers and students. It is found that the vast majority of students desire to fully participate in the teaching process in the classroom, and expect to have the opportunity to ask questions, communicate and discuss. Before class, online self-study is adopted to give full play to the subjective initiative of learning and consult relevant examples of glucose metabolism. In addition, with the help of high-quality online teaching resources, students can fully grasp or be familiar with the process of glucose metabolism in advance.

Offline teaching, teachers give students more opportunities to participate in teaching activities. In the classroom, teachers can organize students to carry out group discussion teaching in combination with examples in life, which can not only play the leading role of teachers, but also reflect the main role of students.

2.2.2. Build a mind map with glucose metabolism as the core theme

Mind mapping has been widely promoted and applied to the teaching practice of various disciplines by the educational community, and has been proved to play a positive role in achieving teaching objectives^[5]. Constructing the thinking map of glucose metabolism is helpful to establish and develop the cognitive system; it is useful for students to actively explore and discover the knowledge points of glucose metabolism, and it is good for students to systematically sort out and construct the relationship between glucose metabolism knowledge. The specific steps are as follows: firstly, the core main line of glucose metabolism is marked with different colors, and ideas and extensions are carried out around the main line, and then lines are used to connect the contents of each branch. Simple mind mapping can succinctly outline the logical relationship of various metabolic pathways of glucose metabolism, and lead to the basic concepts related to glucose metabolism (Fig.1).

2.2.3. Flipped classroom

Flipped classroom reverses the teaching mode of teachers' speaking in class and students' practicing after class into students' learning before class and teachers' guiding in class, that is, before class, students use the network to self-study the course videos and courseware uploaded by teachers, and then conduct online tests on the learning platform to detect the self-study effect and find problems that are difficult to solve in self-study. The whole class is divided into a study group of 3-4 students, and the cases related to glucose metabolism are selected for analysis and experimental design. Adopt the research background - scientific problems - method - results and discussion to make PPT, and then teach in class (Fig. 2).

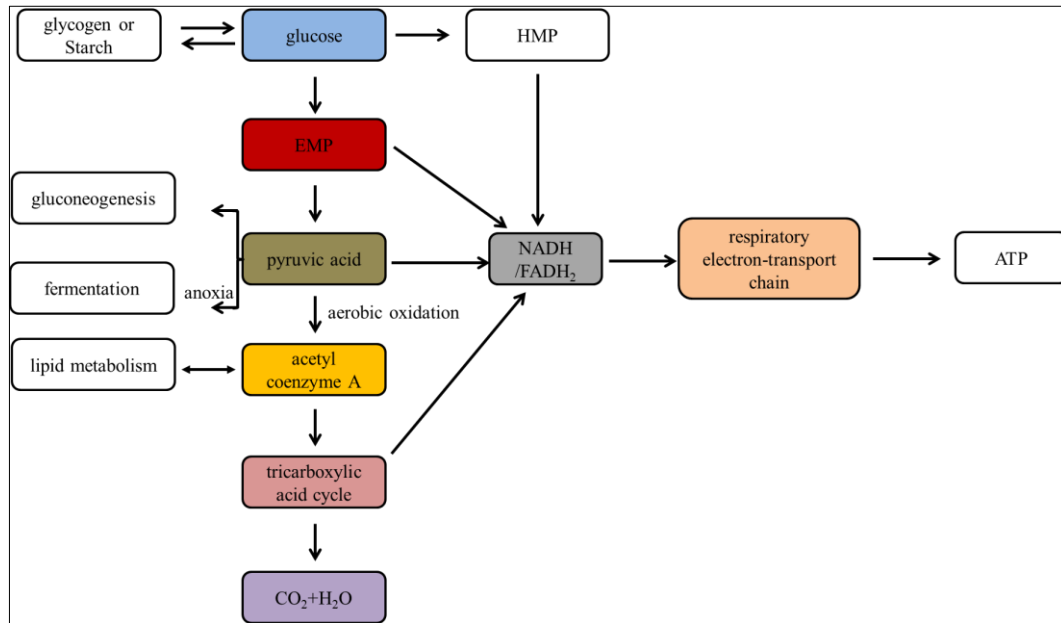


Fig 1: Thinking map of glucose metabolism

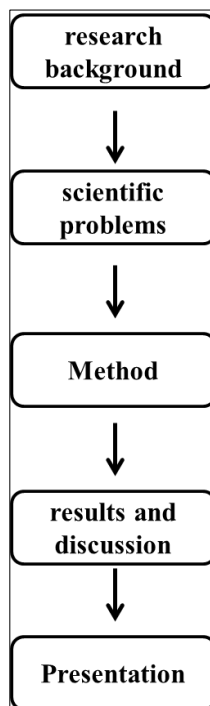


Fig 2: Schedule of flipped classroom

2.3. Summarize the knowledge points of glucose metabolism

Glucose metabolism can be mediated by three pathways: anaerobic respiration, aerobic respiration and pentose phosphate pathway. Among them, pyruvate produced by anaerobic respiration can be oxidized to lactic acid. In addition, pyruvate can also be used as the substrate of aerobic respiration to decompose into acetyl coenzyme A, enter the tricarboxylic acid cycle, decompose into CO_2 and H_2O , and produce ATP.

2.4. Class Discussion

The teacher will review the life examples again, let the students explain and discuss them with the knowledge they have learned, activate the classroom atmosphere, stimulate

the students' awareness of independent thinking, and shape the students' biochemical thinking. At the same time, combine the theoretical knowledge learned with the actual life, and deepen the biochemical knowledge system.

2.5. Assign homework after class and strengthen knowledge content

Assign homework after class, such as sugar anaerobic respiration, aerobic respiration and the concept of tricarboxylic acid cycle; Glucose produces ATP number through aerobic oxidation; Problems such as tricarboxylic acid cycle help students strengthen their knowledge.

3. Teaching reflection

In the teaching process of glucose metabolism, the subject is introduced by the life example introduction teaching method, and the metabolic process is explained through the guidance and rhetorical teaching methods, which are linked and progressive layer by layer to explain the knowledge points. Draw the thinking map of glucose metabolism to help them build the glucose metabolism network. Flipped classrooms and cultivate students' ability of autonomous learning and group cooperation.

4. Conclusion

In teaching glucose metabolism, the integration of real-life examples, varied teaching methods, and active student participation enhances understanding. Utilizing case-based studies, such as fermentation processes and exercise-related glucose metabolism, engages students and links theoretical concepts to practical applications. Discussion teaching and flipped classrooms promote deeper learning and problem-solving skills, while mind mapping helps organize and visualize complex pathways. Summarizing key metabolic processes and assigning relevant homework reinforce knowledge. This multifaceted approach fosters not only a comprehensive grasp of glucose metabolism but also cultivates critical thinking, collaborative skills, and a connection between theory and practice, enriching the overall learning experience.

5. References

1. Cheng BS. Speech at the national conference on undergraduate education in colleges and universities in the new era. *China higher education*. 2018;(Z3):4-10.
2. Beidachang action: Set off a new revolution in higher agriculture and forestry education; c2019. http://www.moe.gov.cn/jyb_xwfb/s5147/201909/t20190923_400289.html.
3. Tang L. Primary study of the teaching reform of Animal Biochemistry. *Hubei journal of animal and veterinary sciences*. 2020, 41(3).
4. Zhao SM, Zhang YY, Huo JL, Da YX, Li WZ. Use Thinking Map Flexibly to Improve the Teaching Quality of Animal biochemistry. *Acta Ecologiae Animalis Domastici*. 2021;42(9):94-96.